Planetary Protection Challenges in Visionary Exploration

John D. Rummel
Science Mission Directorate
NASA Headquarters
Washington, DC 20546
USA
jrummel@hq.nasa.gov

Planetary protection in solar system exploration is aimed at preventing biological contamination of other worlds and the potential contamination of Earth by extraterrestrial life. A planetary protection policy has been applied to solar system exploration missions since their inception, and is important to preserving one of the most significant goals of astrobiology—learning about the existence of life or significant organic chemistry elsewhere—while not erasing the information on which such studies depend.

A long-range plan for the exploration of Mars, using the Moon as an interim destination, has been adopted by NASA and is envisioned by ESA through its Aurora program. Elsewhere in the solar system, robotic exploration will continue apace, along with the challenges of studying icy, and perhaps watery, worlds. For humans to explore the surface and deep subsurface of Mars without contaminating it, improvements must be made in the technologies and operational concepts they will employ. To operate on Mars, explorers must overcome numerous environmental and personal challenges. Humans "invading" the planet should recall the lessons of H.G. Wells's, *War of the Worlds*; potential Mars-sourced biological contamination must be understood before humans can safely occupy the planet. Planetary protection considerations will affect the development of surface-capability systems such as habitats, EVA/EHA systems, and exploration tools such as drill rigs.

Within this vision of exploration, translating scientific findings into appropriate planetary protection requirements—and those into affordable and achievable engineering solutions—will remain a central challenge in astrobiology.